Boise Police demonstrate how they use robots at the annual science, technology, engineering and math (STEM) expos, which INL co-sponsors so students can understand complex concepts through hands-on activities.

Science, technology expos let students learn by experience

By Marilyn Whitney, *INL Communications & Governmental Affairs*

In order to truly learn, students must "do." Hands-on activities let students observe, touch, manipulate, test and understand the concepts they study. Through several annual science, technology, engineering and math (STEM) expos, Idaho National Laboratory and partner universities create fun, relevant experiences for Idaho middle-school students.

At this year's STEM expo at Northwest Nazarene University, more than 1,200 participants had a chance to experience NNU's new Thomas Health Science Center, a $10 million, 50,000-square-foot, state-of-the art science and math building on the Nampa campus. This green building features structural elements and materials that reduce environmental impact. It also incorporates cross-discipline laboratories that encourage interaction among faculty and students.

Students learned about brain function and anatomy using preserved and plastinated human brains and discussed brain health and diseases such as Alzheimer's.

Under the direction of biology department chair John Cossel, NNU undergraduates helped students explore the principles of osmosis and photosynthesis, and the biology of amphibians and reptiles. Students also explored human brain anatomy and function by examining preserved brains. Beyond learning science and math concepts, the interaction with college students helped the middle schoolers make connections between what they are learning today and areas of study and career opportunities after high school.

The NNU Expo also included activities facilitated by experts from the Deer Flat Wildlife Refuge, the World Center for Birds of Prey, and NASA. The feature presentation "Splat: Science of Impact," by the Discovery Center of Idaho, let students explore bulletproof vests, parachutes, bungee cords and crumple zones to see how engineers and scientists are helping protect people in dangerous situations.

"This event really helps our students think about science in a new and challenging light," said Marsing Middle School teacher John DeWitt, who has attended the expo with his students for several years. "The classroom becomes real life!"

Lone Star Middle School teacher Monique Gafford, who returned for a second year with her students, summed up the experience as "a great day for our students."

"It reviews material learned in the previous two years in middle school and introduces some of the material they will learn in the future," she said. "I always tell my students that it is a great experience because it gives them the chance to meet with experts in the field and to use some materials that we can't afford at the middle level."

In partnership with Boise State University, INL also sponsors the Engineering Extravaganza, which drew more than 500 middle-school students to the Boise State University campus this year. Participants attended sessions on artificial intelligence, materials science, electrical engineering and physics. Featured presenter Kevin Young led an interactive session on the "Science of Sound." He helped students examine musical instruments and electronic sound amplification equipment to help demonstrate how sound waves are produced, how we hear sounds and how we manipulate sound using technology such as microphones, amplifiers and speakers.

Students who participate in the NNU and BSU expos were invited to bring their families to the annual Discover Engineering Day event on the BSU campus. This free event for the public draws thousands of participants to experience dozens of activities and demonstrations that highlight science, technology, engineering and math.

The youngest participants enjoyed the Block Fest area provided by the Twiga Foundation. This hands-on activity was designed to introduce parents to information about emergent math and science for their young children, along with ways they can support that learning.

The Kuna High School Science Club returned this year to lead a session on building toothbrush robots. The tiny Bristle Bot is constructed using the

head of a toothbrush, pipe cleaners and a small motor. The club also brought back its popular wind turbine design and construction activity.

Also new this year, NASA Education Specialist Tony Leavitt helped participants design and test a lunar lander, and learn about NASA's goal of returning humans to the moon and building a lunar base.

Sponsors of the 2010 STEM expos included the NNU College of Science, BSU College of Engineering, Discovery Center of Idaho, Hewlett-Packard, CH2M Hill, Idaho Power, Micron Foundation, NASA, United Water, URS and the Idaho Department of Environmental Quality.

The annual expos give students a positive awareness of STEM disciplines and encourage them to consider pursuing a technical career path. Supporting education opportunities for students and teachers is an integral part of INL's i-STEM initiative, a coordinated statewide effort by the State Department of Education, Idaho Division of Professional-Technical Education, educators, businesses and industry to support STEM education from kindergarten through 12th grade.

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